Product Family Overview

COMP-00021

SCALING THE CAMPUS INTRANET

CISCO SYSTEMS CATALYST SWITCHING PRODUCTS

CISCO SYSTEMS

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The forces driving campus intranet development are pervasive network usage, any-to-any networking, and common intranet traffic. This exponential rise in bandwidth demand requires network managers to plan a scalable intranet solution that grows over time. Network managers must redesign networks into intranets to scale end-to-end bandwidth and performance many times over as traffic loads increase.

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The *Rise of* Intranet Services

THE RECENT PROLIFERATION OF WEB BROWSER-BASED GRAPHICAL INTERFACES FOR NEW AND EXISTING CLIENT/SERVER AND MISSION-CRITICAL APPLICATIONS HAS MADE IT EASIER FOR USERS TO ACCESS CRITICAL INFORMATION OVER THE NETWORK. CONSEQUENTLY, THE NUMBER OF PEOPLE ENGAGED IN NETWORK ACTIVITY IS RISING ASTRONOMICALLY-ALONG WITH THE AMOUNT OF TRAFFIC PER USER. THIS GROWTH CALLS FOR RE-ENGINEERING INTRANETS BEYOND THE TRADITIONAL CLIENT/SERVER MODEL TO ACCOMMODATE INCREASED BACKBONE TRAFFIC. THE FORCES DRIVING CAMPUS INTRANET DEVELOPMENT ARE PERVASIVE NETWORK USAGE, ANY-TO-ANY NETWORKING, AND COMMON INTRANET TRAFFIC.

PERVASIVE NETWORK USAGE

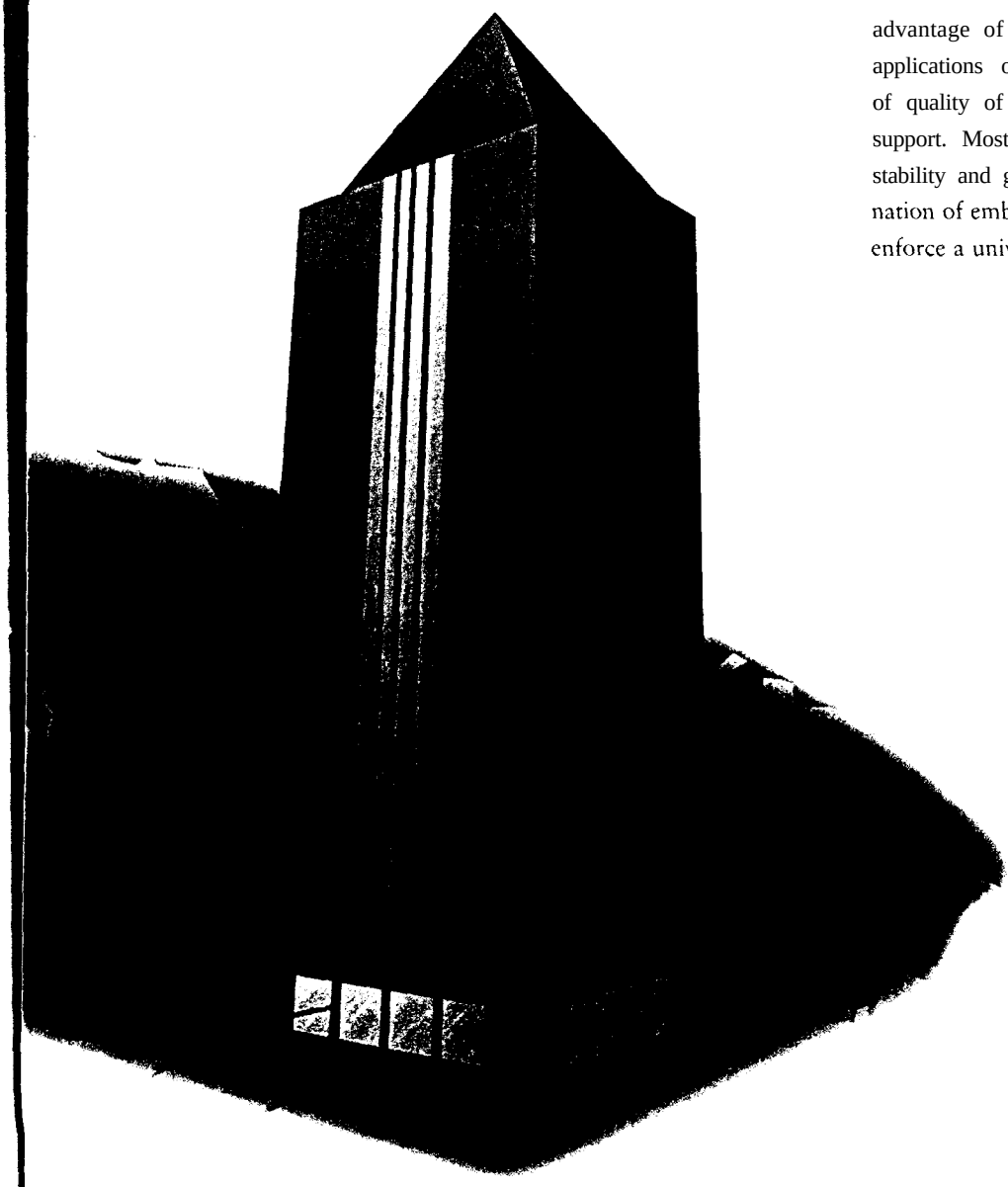
As users increasingly rely on the network for daily productivity and the mission-critical applications that drive revenue, they expect rapid response times and reliable service-needs usually solved with bandwidth. Although new applications are easier to deploy and use, they are also more bandwidth intensive, which compounds the need for a highly scalable network. This exponential rise in bandwidth demand requires network managers to plan a scalable intranet solution that grows over time.

ANY-TO-ANY NETWORKING

Unlike a few years ago, today more network traffic traverses the backbone than stays local. Traffic patterns have shifted. A few years ago, 80 percent of traffic stayed local and 20 percent traversed the backbone. Today, that statistic is reversing itself; 80 percent of traffic now crosses the backbone, while about 20 percent stays local. Users want rapid response times and high reliability. In other words, users are unaware-and do not care-whether they access a local server or one several buildings away. Network managers must redesign networks into intranets to scale end-to-end bandwidth and performance many times over as traffic loads increase.

Common Intranet Traffic

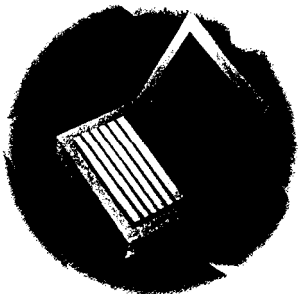
On today's intranets, many applications share the same infrastructure. Administrators must be able to differentiate service levels between mission-critical applications and other traffic. Flexible quality of service (QoS) support based on application or user must sort and intelligently prioritize all Web-based traffic to ensure high availability of essential information and services. Application diversity also creates the need to ensure priority to time-sensitive data such as voice and video while still delivering lower-priority traffic.



Intranet Services

Scalable bandwidth alone does not solve these issues. Cisco Systems believes that network performance depends upon flexible, secure intranet services. If an essential network service-such as security or mobility-is missing or weak, an intranet cannot maintain application integrity to service its users. Security services both protect sensitive information and ensure network stability. Mobility services reduce administrative efforts to manage moves, adds, and changes of users around the intranet.

Along with quality of services, a dynamic intranet must support scalable and differentiable classes of service from end to end. Administrators should be able to take advantage of the latest mission-critical and productivity applications offering the bandwidth management controls of quality of service, multimedia, and multicast application support. Most importantly, in order to manage intranet stability and growth, administrators need a powerful combination of embedded and centralized management tools to enforce a universal network policy.



CISCO SYSTEMS HAS AWARD-WINNING SOLUTIONS THAT MEET THE DEMANDS OF THESE NEW INTRANETS. CISCO SOLUTIONS INCLUDE A COMPREHENSIVE SET OF SWITCHING PRODUCTS CALLED THE CISCO CATALYST'" SWITCH FAMILY, AND AN INTEGRATED SUITE OF NETWORK MANAGEMENT TOOLS CALLED CISCOWORKS™ FOR SWITCHED INTERNETWORKS (CWSI). THE CATALYST SWITCH FAMILY SPANS THE ENTIRE USER APPLICATION SPECTRUM, FROM COST-CONSCIOUS DESKTOP AND WORKGROUP SWITCHES TO MULTILAYER-CAPABLE SWITCHES FOR SCALABLE ENTERPRISE APPLICATIONS INTHEWIRING CLOSET,DATACENTER,AND BACKBONE. NO OTHER SWITCHING VENDOR CAN OFFER ITS CUSTOMERS THE SCALABILITY, BREADTH, PERFORMANCE, AND MANAGEABILITY OF THE CATALYST FAMILY OF SWITCHING SOLUTIONS.

CiscoFusion: The Key to Scaling the Intranet

The Catalyst family and Cisco IOS™ software are an integral part of an end-to-end Cisco internetworking solution. The Catalyst family of switches is crucial to the CiscoFusion™ network architecture. Catalyst solutions lead the industry in new standards development and adoption with technologies supporting a wide array of media types, features, and functionality. Customers can choose among the widest available selection of media types and speeds-even future standards-based Gigabit Ethernet. The key to cost-effective scalability across the intranet is multilayer (Layer 2/Layer 3) NetFlow™ Switching, which distributes virtual LAN (VLAN) and other Layer 3 services into Catalyst family switches after initial negotiations with a Cisco router.

The key component of the CiscoFusion architecture is the Cisco IOS software. Optimized for switching, the Cisco IOS feature set delivers advanced network services to Catalyst platforms and enables networked applications including support for multicast and multimedia services and extensive security services. Cisco IOS software also provides extensive security services and mobility services for VLAN configuration and management, IP address management, and secure access to network services. Adminstrators manage Cisco intranets with a combination of embedded Remote Monitoring (RMON) agents and External Switched Port Analyzer (ESPAN) support in every Catalyst switch and with CWSI, a policy-based centralized management system.

Cisco IOS *Software for Switching*

The following table summarizes the Cisco IOS software features for the Catalyst switches:

Cisco IOS Network Services	Function	Benefits
Cisco IOS Scalability Services		
NetFlow Switching	Integrates Layer 2 and Layer 3 switching	Increased performance scalability; greater traffic control without additional management
Cisco IOS Multimedia Services and Quality of Service		
Cisco Group Management Protocol (CGMP)	Allows routers to configure multicast filtering on Catalyst family switches while leveraging switching performance	Supports new distance learning, videoconferencing, and other multicast applications without compromising application performance
Resource Reservation Protocol (RSVP)	With RSVP support on the routers, priority services are communicated to Catalyst 5000 switches	Assists end-to-end bandwidth allocation for multimedia traffic
Available Bit Rate (ABR)	Enables priority allocation on a per-application, per-user basis when coupled with additional switch priority services	Enables service differentiation to give priority to a line of business applications or users
Cisco IOS Connectivity Services		
Dynamic **Inter-Switch** Link (ISL)	Automatically configures VLANs end to end over multiple trunk interfaces and devices	Eases administration of mobile workforce; eliminates misconfiguration errors
Dynamic Host Configuration Protocol (DHCP)	Automatically assigns IP addresses from a specific range to users in a workgroup network	Eases administration of scarce IP address resources; allows information flow control between workgroups by controlling IP address access lists assigned to workgroups; eases network-layer addressing overlay with VLANs
Cisco Discovery Protocol (CDP)	Allows switches and routers to discover and report **networked** VLANs regardless of media type	Eases management of multiple workgroups in VLAN-based intranets
VLAN Trunking Protocol (VTP)	Allows switches and routers to automatically configure and join VLANs regardless of protocol such as 802.10, ATM LAN Emulation (LANE), ISL, or future 802.14	Automates configuration and management of workgroup VLANs; dynamically synchronizes VLAN information across intranets
Cisco IOS Security Services		
Terminal Access Controller Access Control System Plus (TACACS+)	Provides logon security access services to switched intranctworks	Helps secure network resources from unauthorized access
Port Lockdown Services	Records station IDs of authorized users and prohibits access of other stations	Ensures network security; eliminates unauthorized moves, adds, or changes
Syslog Daemon (Syslog)	Reports unsuccessful logon attempts, attempted connection of unauthorized stations, and other critical system events	Provides security audit trails for network administrators; helps administrators determine unsecured areas of network
Cisco IOS Management Services		
Embedded RMON services	Provides statistics, history, events, and alarm information per switched port	Aids managers in troubleshooting network faults; provides vital information for capacity and growth planning
Enhanced Switched Port Analyzer (ESPAN)	Copies traffic from any single port, group of ports, or VLAN to a switched interface for capture by external network analyzer	Allows more in-depth analysis or troubleshooting through external analyzers; facilitates integration of specialized analysis tools
Cisco IOS Reliability Services		
Spanning Tree Protocol (802.1d) per VLAN	Supports link and system redundancy per VLAN in addition to LAN devices	Provides enhanced network resiliency tailored toward VLAN networks
Simple Server Redundancy Protocol (SSRP)	Provides resiliency services for ATM LANE services	Allows managers to deploy resilient ATM-based LAN networks
Hot Standby Router Protocol (HSRP)	Provides resiliency services for routers	Lets managers deploy fault-tolerant routing services

Catalyst Switch Family

CATALYST SWITCHES FROM CISCO SYSTEMS HELP USERS EASILY SCALE THEIR INTRANETS TO ACCOMMODATE INCREASED USERTRAFFIC LOADS. THE CATALYST FAMILY DELIVERS BROAD MEDIA AND PROTOCOL SUPPORT ALONG WITH THE COST-EFFECTIVENESS REQUIRED FOR TODAY'S DESKTOP, WORKGROUP, AND BACKBONE APPLICATIONSTO CREATE HIGH-PERFORMANCE, ENTERPRISE-WIDE, SWITCHED INTERNETWORKS.

CATALYST 5000 SERIES

The Catalyst 5000 series, comprising the Catalyst 5500, 5000, and 5002, supports demanding intranet activity in the wiring closet, data center, or backbone. The Catalyst 5000 series offers the highest level of intranet services support optimized for high-performance enterprise applications with multiprotocol NetFlow Switching, ready architecture for Layer 2 and Layer 3 switching, and enhanced traffic management capabilities. The flagship Catalyst 5500 switch supports both frame and cell switching, scalable to 36 million packets per second (pps). The modular architecture of Catalyst 5000 series switches enables customized connectivity to every media type—supporting ATM and scaling to support standards-based Gigabit Ethernet-with complete redundancy and investment protection features.

CATALYST 3000 SERIES

The Catalyst 3000 stackable switch series offers wire-speed performance, switched fault-tolerance capabilities, embedded VLAN and RMON support, along with a unique, stackable software/hardware architecture. In addition co these capabilities, the Catalyst 3000 series accommodates WAN routing options for branch or remote office applications. This platform is a perfect solution for branch offices and remote wiring closets that require scalability and fault tolerance.

CATALYST 2900

The Catalyst 2900 is Cisco's industry-leading, 10/100-Mbps Ethernet switch for workgroups. Combining wire-speed performance with embedded traffic management, including RMON and VLANs, the Catalyst 2900 is an ideal solution for highly managed 10/100-Mbps switched workgroups.

Catalyst 2820/1900

The Catalyst 2820 Ethernet workgroup switch offers cost-effective wiring closet connectivity with 24 switched 10BaseT ports and two high-speed expansion slots, with options for Fast Ethernet, Fiber Distributed Data Interface, (FDDI), and future ATM on plug-in modules.

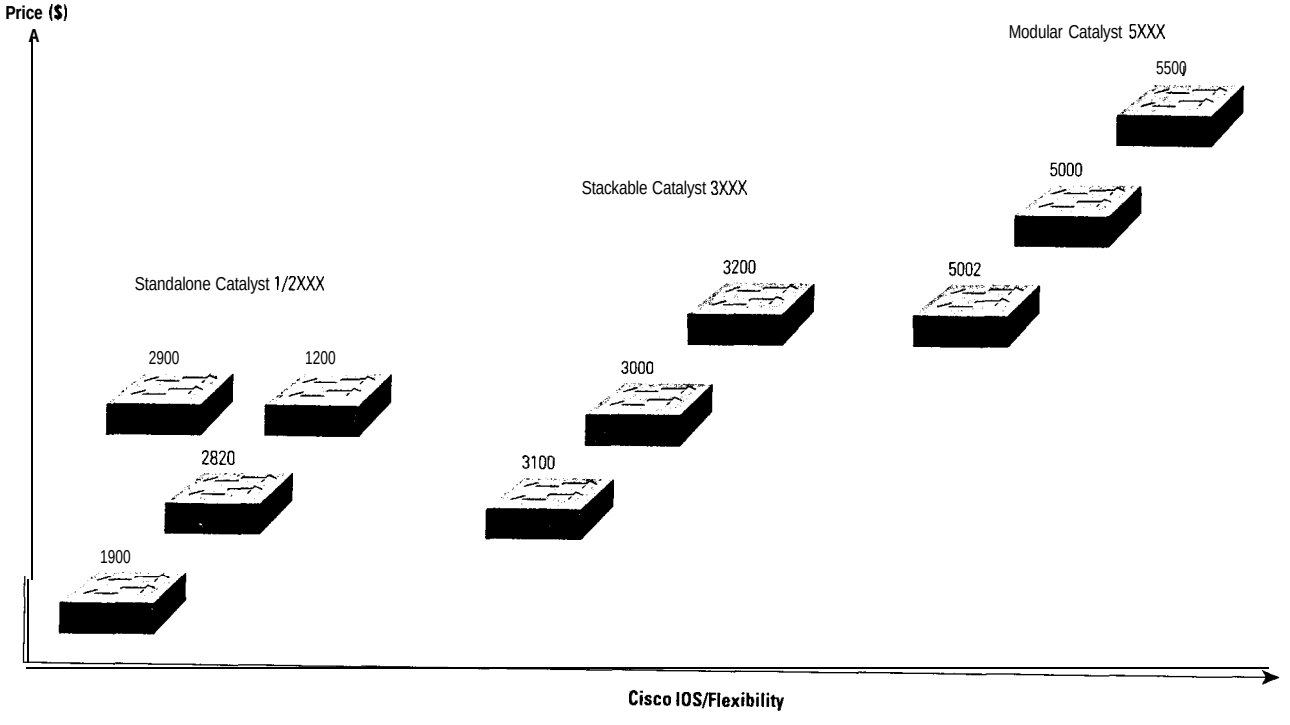
The Catalyst 1900 Ethernet workgroup switch offers exceptional affordability-the industry's best price/performance value for high-performance Ethernet networks. This switch is equipped with 12 or 24 switched 10BaseT ports and one or two 100BaseT ports for high-speed connectivity to servers and backbones.

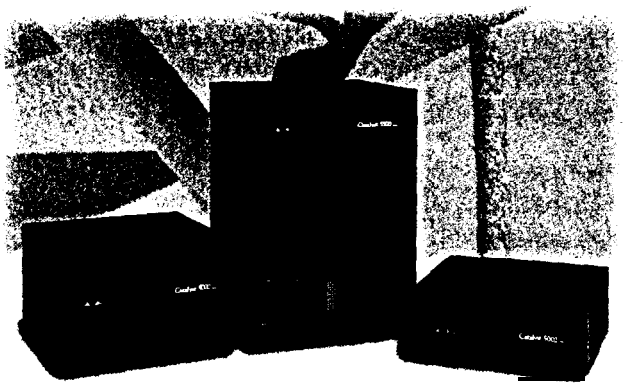
The Catalyst 2820/1900 platform supports the latest Cisco IOS software features including broadcast storm control and future Inter-Switch Link (ISL) support.

Catalyst 1200

The Catalyst 1200 is a highly intelligent, multilayer switch that supports embedded RMON and VLANs, as well as IP multicasting and routing functions. The Catalyst 1200 is well suited for applications that require highly managed switching on Ethernet/FDDI networks.

The Catalyst product family spans the industry's widest range of switching solutions.

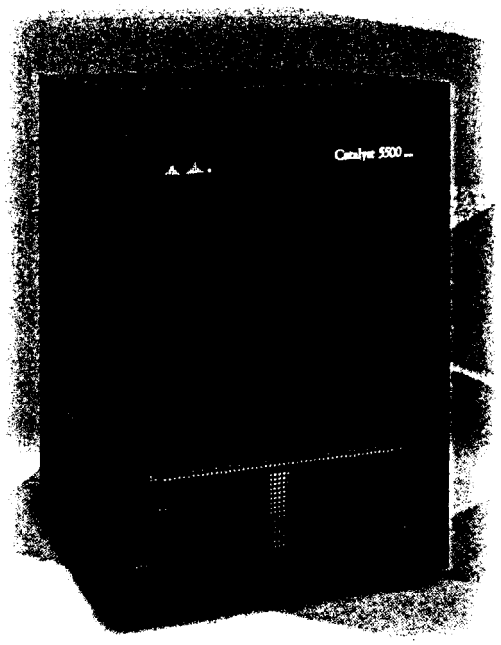




Cisco's award-winning Catalyst 5000 series continues to set the standard for switching solutions.

Scaling the Intranet with Integrated NetFlow Switching

Cisco Systems' flagship Catalyst 5000 series switches are the industry's most powerful switching solutions in the wiring closet, data center, or backbone. The series features a Gigabit Ethernet and ATM-ready platform offering users high-speed trunking technologies including Fast EtherChannel™ and OC-12 ATM. The Catalyst 5000 series also features a redundant architecture, dynamic VLANs, complete intranet services support, and media-rate performance with a broad variety of interface modules. Modules for the Catalyst 5000 series models-the Catalyst 5500, 5000, and 5002—are designed for complete interoperability and investment protection. New functionalities in the Catalyst 5000 series support multiprotocol NetFlow Switching for scalable convergence of Layer 2 and Layer 3 switching, adding the benefits of multiprotocol, multilayer switching and other Cisco IOS network services.

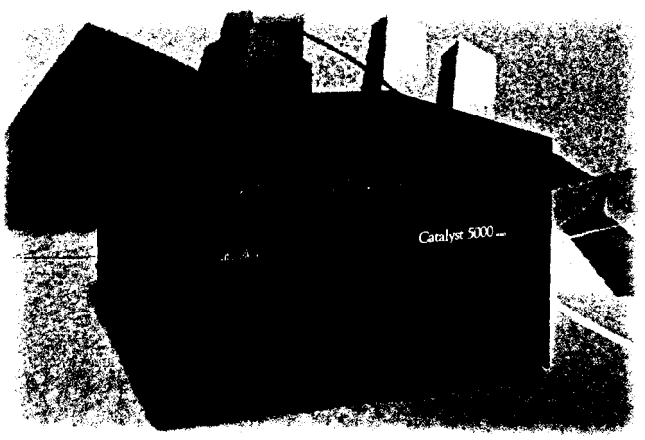


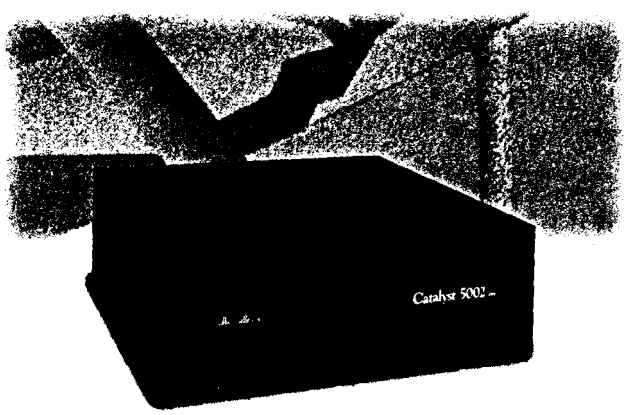
Catalyst 5500: Gigabit Scalability and Performance
The Catalyst 5500 switch is the most flexible, high-capacity enterprise switch in the industry. At 13 slots, up to 528 ports of Ethernet capacity, and a maximum 36 million pps performance, the Catalyst 5.500 switch is ready for Gigabit Ethernet and very high-speed ATM switching. New functionality unique to the Catalyst 5500 switch combines the three CiscoFusion elements of routing, ATM, and LAN switching on a single platform. It is optimized for scalability, reliability, and performance in the wiring closet, data center, or network backbone.

As the most scalable Catalyst switch ever, the modular Catalyst 5500 switch can deliver gigabit performance with integrated cell and frame switching over the LAN, along with a fully redundant architecture and complete suite of Cisco IOS technologies for switching. The optional onboard ATM Switch Processor (ASP) module brings the power and functionality of the LightStream© 1010 ATM switch directly into the Catalyst 5500 switch-enabling ATM migration in the wiring closet, backbone, and data center, The Catalyst platform accommodates existing interface and port adapter modules from the popular LightStream 1010 ATM switch.

Catalyst 5000: Award-Winning Performance Gets Better
The award-winning Catalyst 5000 switch provides the capabilities that organizations need to build flexible, switched internetworks that deliver optimum reliability and performance. The Catalyst 5000 has five modular slots for configuration flexibility. Leveraging high-density, cost-effective switching modules, the Catalyst 5000 platform is an excellent wiring closet solution. Configuring multiple Catalyst 5000 switches provides a resilient solution in the data center. This switch provides a stable migration path from a maximum of 192 10BaseT ports to heterogenous switched high-speed links with over one million pps performance, scaling to many millions pps in the future.

Catalyst 5002: Enterprise Power in a Compact Package
The Catalyst 5002 switch delivers Cisco IOS software for switching and Catalyst 5000 series performance in a compact size. Its two-slot chassis supports a single supervisor card and one interface module, enabling users to extend Catalyst 5000 series performance architecture to the network periphery. The Catalyst 5002 switch supports all Catalyst 5000 interface modules for maximum flexibility and dual load-sharing power supplies for resilience.





New Supervisor Engines and Interface Modules Increase Performance and Protect Investments

New, higher-performance Supervisor Engine II modules for the Catalyst 5000 series support new functionality without replacing existing interface modules. The new engine has a modular feature card that easily swaps out to accommodate future technology advancements-such as NetFlow Switching-while protecting current investments in the switching modules. Two built-in Fast Ethernet uplink ports support Fast EtherChannel for physical link redundancy and bandwidth aggregation for increased throughput between systems. As a bundling technology, Fast EtherChannel leverages Fast Ethernet to scale performance up to 800 Mbps between Catalyst 5000 series switches and other switches, routers, and servers. Fast EtherChannel is a pathway for building multigigabit networks for future application to Gigabit EtherChannel on Gigabit Ethernet. Supervisor Engine I continues as the more cost-effective option for wiring closets on the Catalyst 5000 and 5002 switches.

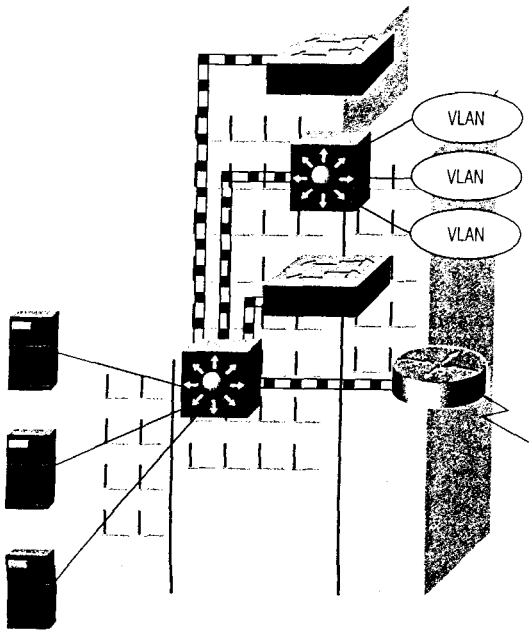
The range of media support in the Catalyst 5000 series enables network managers to deliver high-performance backbone access to accommodate Web browser-based traffic across the intranet. A growing number of interface modules operate in any Catalyst 5000 series switch to deliver dedicated bandwidth to users through high-density group switched and switched 10BaseT or 100BaseT Ethernet; flexible 10/100BaseT Ethernet, fiber-based Fast Ethernet, and Fast EtherChannel; CDDI/FDDI; ATM LAN Emulation (LANE); the Route Switch module (based on the Route Switch Processor for the Cisco 7500 router series); and future Token Ring and Gigabit Ethernet. Unique to the Catalyst 5500 platform are the ATM Switch Processor and ATM switch interface modules and port adapters. All Catalyst 5000 series switches deliver full media-rate performance over all interfaces.

Cisco IOS Software Features Prepare Catalyst 5000 Series for Future Intranets

The Catalyst 5000 series supports scalability beyond port density and increased bandwidth capacity with NetFlow Switching capability, which offloads frame-forwarding Layer 3 switching functions from the central router to exponentially increase performance on very large networks. Leading-edge Cisco IOS software completes the service offering to make the Catalyst 5000 series switches the most versatile and powerful switching platform in the industry.

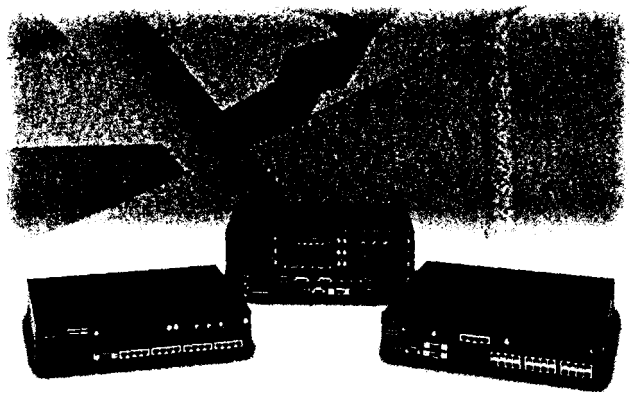
Award-Winning Catalyst 5000 Series

- *Datamation* Product of the Year, 1997
- *Net Ware Solutions* Reader's Choice Award: Best Switches, September 1996
- *Network Computing* Editor's Choice Award, July 1996
- *Data Communications* Tester's Choice Award, February 1996
- *Data Communications* Tester's Choice Award, May 1996
- *Data Communications* Tester's Choice Award, September 1996
- *Data Communications* Tester's Choice Award, November 1996



The versatile Catalyst 5000 switch series enables NetFlow Switching services in the data center, backbone, or wiring closet

Feature	Function	Benefit
Chassis		
Modular 2-, 5-, and 13-slot chassis	Supports required Supervisor Engine and 1, 4, or 11 additional interface modules	Common architecture that can be standardized for campus-wide intranets
Fault-tolerant Supervisor Engine (Catalyst 5500/future Catalyst 5000)	One or two per chassis	Increases reliability using switching engines in a fault-tolerant configuration
Fault-tolerant clock modules (Catalyst 5500)	Offers two clock modules	Increases r&ability using clock modules in a fault-tolerant configuration
Switching modules	Offers wide variety of interface choices: 10-Mbps Ethernet, 100-Mbps Fast Ethernet, CDDI/FDDI, ATM, and future Token Ring and Gigabit Ethernet	Accommodates all LAN and backbone technologies, providing easy migration and future-proofing the network
Frame Switch Fabric and CPU (Catalyst **5500/5000/5002)**		
Supervisor Engines: Specialized modules have hardware-based switching engine, table for 16,000 MAC addresses, two 100-Mbps Fast Ethernet uplinks, and network management processor	Delivers over one million pps, low-latency, low-cost switching for wiring closet, data center, and backbone applications; full local and remote management	Provides completely manageable switching system to deliver high-performance switching for even the most demanding switch applications
Two versions: Supervisor Engine I and Supervisor Engine II with modular Feature Card and Fast EtherChannel	Filtering/forwarding logic provides accurate filtering and aging of MAC addresses and their corresponding VLANs	Supervisor Engine I: cost-effective wiring closet solution
	Choice of 100BaseTX and MII or 100BaseFX	Supervisor Engine II: scalable and expandable to accommodate NetFlow Switching and Fast EtherChannel
		Accommodates simultaneous Ethernet-to-Ethernet, Ethernet-to-Fast Ethernet, Ethernet-to-FDDI and -ATM packet switching; Fast Ethernet-to-FDDI and -ATM packer switching; uses cost-effective UTP or multimode fiber (for long distances)
Feature card on Supervisor Engine II	Implements advanced switch and traffic managment mechanisms; field-upgradahle	Allows for easy upgradability and investment protection as standards evolve
Switching architecture	Media-independent frame switching backplane accommodates Ethernet, Token Ring, FDDI, and ATM simultaneously	Delivers single-system solution for all current desktop switching needs with migration path to ATM and future Gigabit Ethernet
NetFlow Switching	Supports Layer 2 and Layer 3 switching	Provides migration path to Layer 3 switching in the wiring closet wirh full investment protection of existing switch modules
Scalable switching performance from 1 million to 36 million pps	Forwards over one million 64-byte Ethernet pps; scales to multimillions of pps with new feature card on Supervisor Engine	Designed to meet throughput demands of a fully populated system with all interfaces operating at wire speed
Three priority levels on switching backplane	Accommodates technologies that use priorities, such as ATM and Token Ring; enables users to define higher priority on a per-interface basis	Ensures that server traffic has priority over all other traffic; accommodates bursty traffic and prevents higher-layer protocols from timing out by giving an interface the highest priority on rhe backplane until buffer content drops
Catalyst 5500 Cell Switching Fabric		
5-Gbps switch bandwidth	Fully nonblocking	Maximizes performance with no cell loss within fabric
Shared memory fabric	Switch memory shared across all ports	Allows for high degree of effective buffering, multiplying physical buffer space
Large cell buffers	65,536 cells	Minimizes cell loss probability
Feature card on ASP module	Implements all advanced switch and traffic management mechanisms; field upgradable	Allows for easy upgradability and investment protection as standards evolve



Stackable Catalyst 3000 series switches manage costs while providing advanced Cisco IOS software functionality

CATALYST 3000 STACKABLE SWITCHES

Building on its switching expertise, Cisco has developed the Catalyst 3000 system, a high-performance, stackable switching platform consisting of the Catalyst 3000 series switches and Catalyst 3000 Matrix. This switch platform is the first stackable switching architecture to deliver Layer 2 and Layer 3 functions in its stackable software for growing work-group applications. The flexible design enables additional switching capacity without migrating to a new platform.

The Catalyst 3016 base system supports 16 fixed Ethernet ports with two expansion slots. The Catalyst 3 100 switch has 24 fixed Ethernet ports plus one FlexSlot. The Catalyst 3200 switch is fully modular, with seven expansion slots, including one FlexSlot.

Each expansion slot can be populated from a selection of modules to suit user requirements. All Catalyst 3000 LAN expansion modules are compatible with any Catalyst 3000 series switch. Any combination of up to eight Catalyst 3016, 3100, and 3200 units can be stacked to achieve a system of up to 224 switched Ethernet ports with an aggregate switching capacity of 3.84 Gbps. If high-speed connectivity is required, users can populate expansion slots with Fast Ethernet, 100VG-AnyLAN, or ATM modules to support connections to servers, routers, or other switches in the enterprise network.

The FlexSlot in the Catalyst 3100 and 3200 switches accepts either a standard Catalyst 3000 expansion module or new, double-wide expansion modules. The first available FlexSlot module is a routed WAN interface module based on the Cisco 2500 router series with two high-speed serial ports, an Integrated Services Digital Network Basic Rate Interface (ISDN BRI) port, and an AUX port.

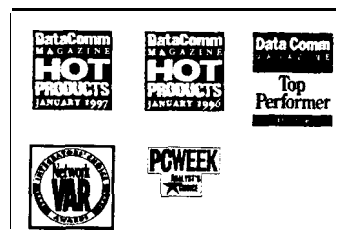
The Catalyst Matrix functions as a switch of switches. Each Catalyst 3016, 3100, or 3200 switch is connected to the Matrix via a 280-Mbps StackPort expansion module. The Matrix provides up to 3.84 Gbps of total switching capacity, A redundant Catalyst Matrix module can be installed to provide fault tolerance.

High-performance features in the Catalyst 3000 series include adaptive cut-through switching technology with automatic error packer detection and elimination. These capabilities fulfil1 user requirements for low-latency switching applications while maintaining the data integrity of store-and-forward devices. A built-in redundant power supply provides reliability.

Catalyst 3000 Switching Applications

The stackable architecture of the Catalyst 3000 switch series allows it to cost-effectively address a wide spectrum of applications. In smaller configurations, it can switch 16 to 24 Ethernet segments with high-speed uplinks connecting servers and other backbone resources. Stacked switches can be managed as one logical entity IP address, overcoming one of the primary obstacles of managing stackable devices.

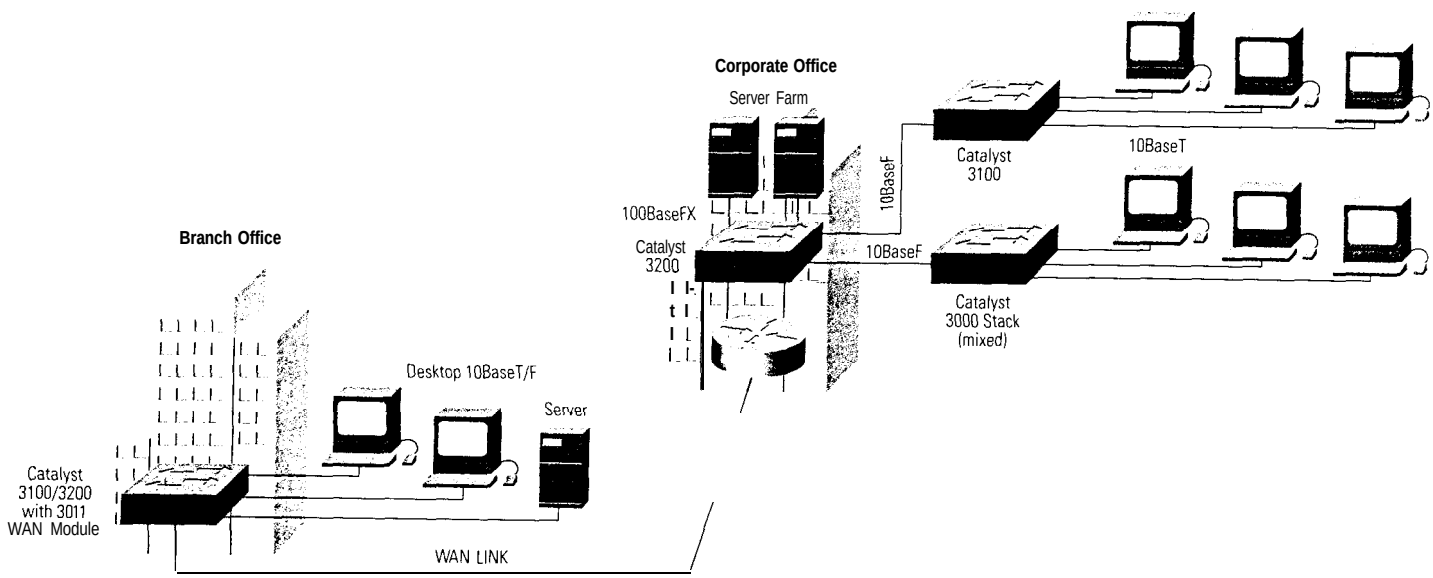
New WAN support makes the Catalyst 3000 series an ideal branch office solution with high-speed serial and ISDN connectivity between systems in smaller offices, or from branch offices to a Catalyst 5000 switch in the central office.



Award-Winning Catalyst 3000 Series

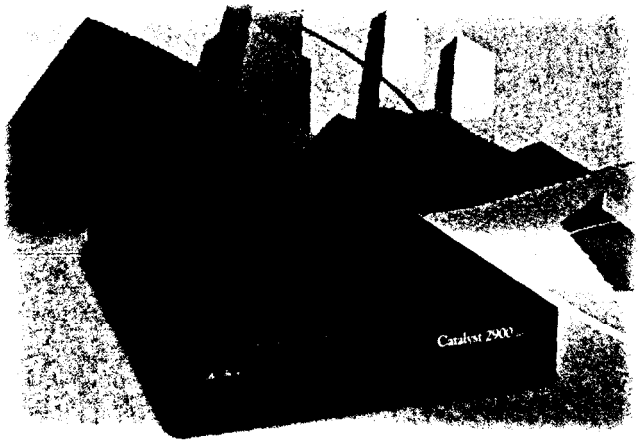
- *Data Communications* Hot Product Award, January 1997
- Data *Communications* Hot Product Award, January 1996
- *Data Communications* Top Performer Award, July 1995
- *Network VAR* Integrator's Choice Award, 1995
- PC *Week* Analyst's Choice Award, 1995

The Catalyst 3000 series serves a variety of applications as stacks in wiring closets, WAN connectivity to branch offices, or server access



In addition to Cisco's universal switching software features, the Catalyst 3000 series switches provide these capabilities:

Performance/Resiliency		
Adaptive cut-through switching	Allows wire-speed, low-latency switching using cut-through packet switching for optimal performance; users can configure automatic store-and-forward switching if a cyclic redundancy check (CRC) error user-defined threshold isreached; can also filter runt packets	Provides high-performance switching; ensures data integrity if a network malfunctions; maintains low latency
1 92 kilobytes of per-port buffering for low speed interfaces	Provides extensive packet buffering for low-speed interfaces	Ensures reliable delivery of switched traffic to network desktops
512 kilobytes of per-port buffering for high-speed Interfaces	Provides extensive packet buffering for high-speed interfaces	Ensures reliable delivery of switched traffic to network servers
Redundant switching	Catalyst 3000 Matrix can be configured with redundant modules; second module continues operation if primary module fails	Fault-tolerant operation ensures that no single component brings down the network
Connectivity		
Supports copper, coax, or fiber 10-Mbps Ethernet; copper or fiber 100-Mbps Ethernet; 100Base-VG; and ATM interfaces	Allows flexible configuration of switches to support various network media and topologies	Preserves existing network configuration; ensures easy migration to alternatative LAN technologies
Scalability-Hardware		
StackPort interfaces	Provides a 280-Mbps link between Catalyst 3000 series switches, allowing them to be managed as a single entity	Lets managers easily stack multiple switches fur dynamic switching applications
Catalyst Matrix	Connects up to eight Catalyst 3000 series switches across a 3.8-Gbps switching Matrix	Enables scaling of stacked Catalyst 3000 series switches to 224 ports while delivering optional switch redundancy
Scalabihty-Software		
Distributed switching software	Enables users to expand from a 16-port Catalyst 3016 to a 224-port Catalyst stack managed as a single entity	Architecture provides low entry cost while allowing expansion to greater port density and high-speed connectivity
ATM LANE	Supports VLANs across the ATM switch infrastructure	Allows customers to use ATM backbone technologies to interconnect existing switched LAN users
VLAN support	Supports 64 VLANs within a stack and interoperates with other Catalyst switches	Allows managers to provide switching services to different workgroups using a common network infrastructure
Supports up to 10,000 addresses	Supports 6000 MAC addresses with optional configuration to 10,000 system addresses and 1700 addresses on a per-port basis	Supports large number of addresses to allow installation in many environments
Per-port address aging	Can age addresses on a per-port basis and set address-level thresholds	Allows connection to environments with many MAC addresses (backbones)
Security address filtering	Enables users to configure for source and destination packet filtering	Allows users to set up security filtering to restrict access to certain resources



The Catalyst 2900 switch offers wire-speed performance with advanced Cisco IOS software features, embedded traffic management, and virtual LAN support

A High-Performance Switching Platform with Embedded Traffic Management

The Catalyst 2900 switch provides industry-leading, 10/100-Mbps Ethernet switching for smaller enterprise networks. Based on the award-winning Catalyst 5000 architecture, the Catalyst 2900 is a 14-port, fixed-configuration switch available in two versions: autosensing 10BaseT/100BaseT or 100BaseFX. Combining wire-speed performance with embedded RMON traffic monitoring and VLANs, the Catalyst 2900 is an ideal solution for highly managed switched backbones, server clusters, and high-performance workgroups.

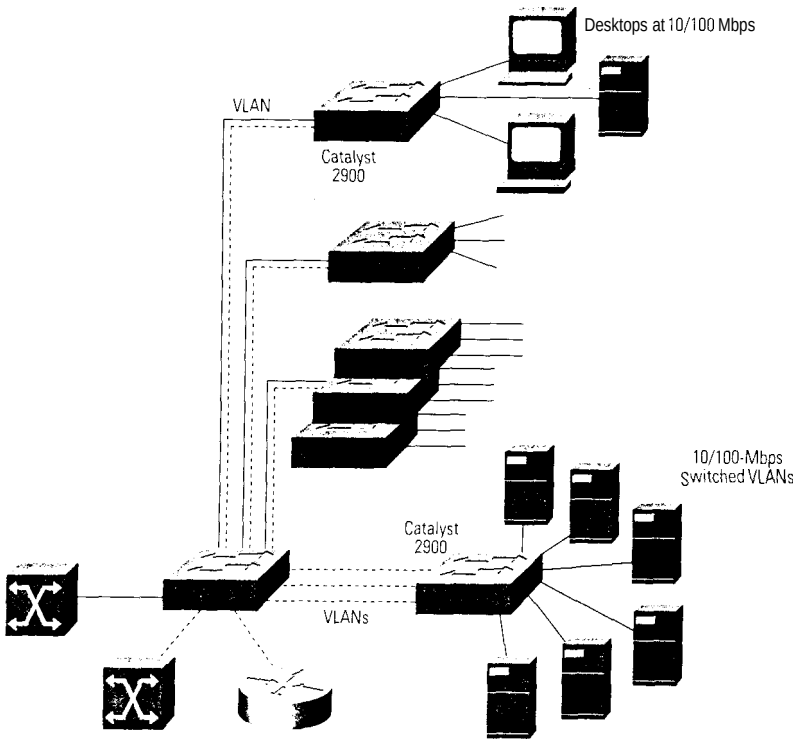
Catalyst 2900 Applications

Backbone Applications

The Catalyst 2900 is well suited for smaller switched Fast Ethernet backbones or server farms, such as high-performance financial analysis centers or medical imaging environments that have collapsed backbones with Fast Ethernet switching at the center, or distributed backbones with Fast Ethernet switching in several locations.

Server Cluster Applications

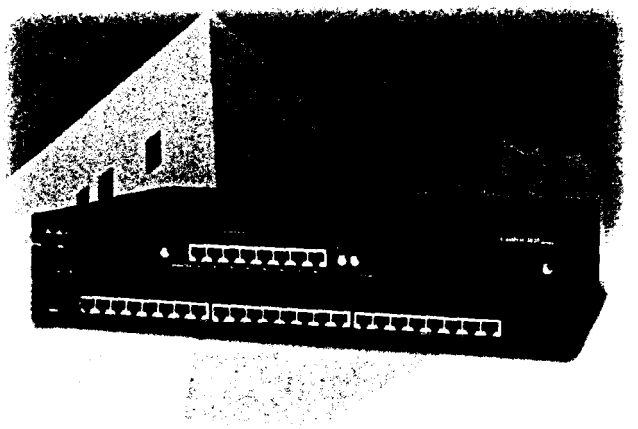
The Catalyst 2900 is ideal for connecting server clusters. In these types of applications, for example in CAD/CAM and IC design environments, it provides the benefits of easy 10-Mbps-to-100-Mbps migration, high-performance throughput for client/server applications, and remote servers.

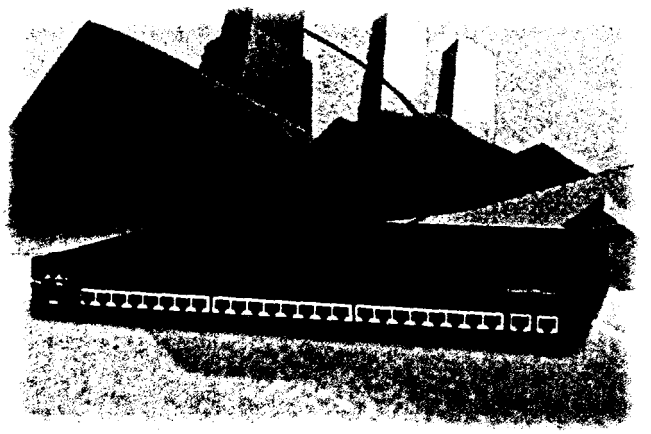


Catalyst 2900 switches bring 10/100-Mbps Ethernet versatility to highly managed switched backbones, server clusters, or high-performance workgroups

In addition to Cisco's universal switching software features, the Catalyst 2900 switch provides these capabilities:

Feature	Function	Benefit
Low latency 1.2-Gbps backplane	Forwards more than one million 64-byte pps	Designed to meet demands of Fast Ethernet switching with interfaces operating at wire speed
Tri-level priority switching	Enables users to define higher priority on a per-interface basis	Accommodates bursty traffic and prevents higher-layer protocols from timing out; reduced application latency
Large interface buffers (192 KB)	Buffers bursty traffic	Enables switch to operate effectively in bursty traffic overload conditions
Hardware-based ASICs for MAC and VLAN addresses	ASICs perform functions in hardware	High speed, low cost with advanced VLAN features
Autonegotiation	Allows switch to negotiate speed (10 or 100 Mbps) or full/half duplex	Conforms to 802.3u; easy migration from 10 to 100 Xlbps
Autosensing	Automatically "senses" speed or half/full duplex if attached device does not negotiate with switch	Easy "plug-and-play" use; easy migration from 10 to 100 Mbps





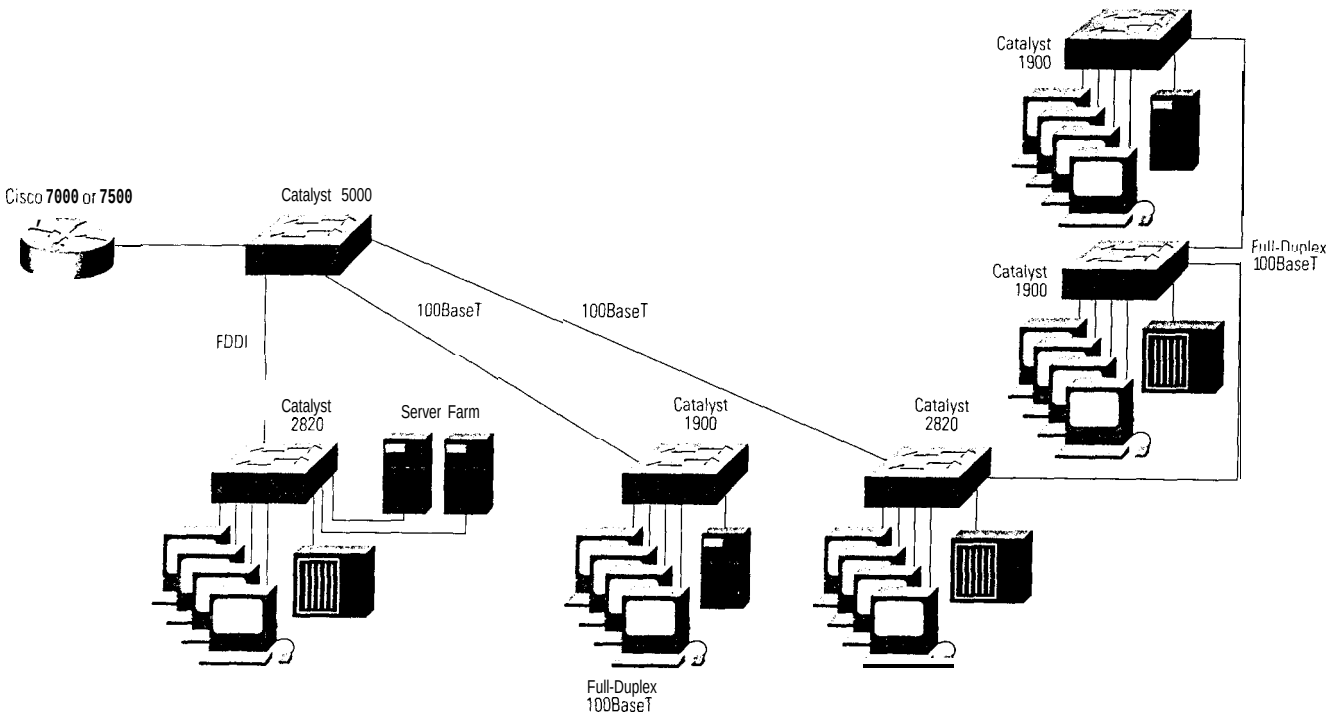
With outstanding price/performance, the Catalyst 2820 and 1900 Ethernet switches deliver exceptional switching capacity.

COST-EFFECTIVE MIGRATION FROM SHARED-MEDIA HUBS

The Catalyst 2820 and 1900 standalone switches are ideally positioned to replace shared 10BaseT hubs in the wiring closet with feature-rich switched Ethernet capability to the desktop at an aggressive price. Cisco IOS technologies enable network multimedia/multicast applications and VLANs with future ISL support to the desktop. A nonblocking, wire-speed, packet-forwarding architecture delivers exceptional switching capacity.

Both Catalyst 2820 and 1900 platforms have a maximum of 24 switched 10BaseT ports and two high-speed uplinks on a 1-Gbps bus. The Catalyst 2820 switch has two expansion slots for a choice of uplink modules supporting Fast Ethernet, FDDI, and future ATM. The Catalyst 1900 switch has one or two fixed 100BaseT uplink ports.

The Catalyst 2820 and 1900 switches provide cost-effective migration away from shared-media hubs in the wiring closet to Workgroup switching with dual high-speed ports to service local servers, backbone uplinks, or connecting multiple switches.



Tests show that performance never skips a beat. Exceptional performance through nonblocking ClearChannel architecture delivers up to 320 Mbps maximum forwarding bandwidth and 450,000 pps aggregate switching performance. A 3-MB packet buffer virtually eliminates packet loss, and an optional redundant power supply is available for greater resilience.

Cut-through and store-and-forward switching modes provide flexibility between low latencies or maximum error checking.

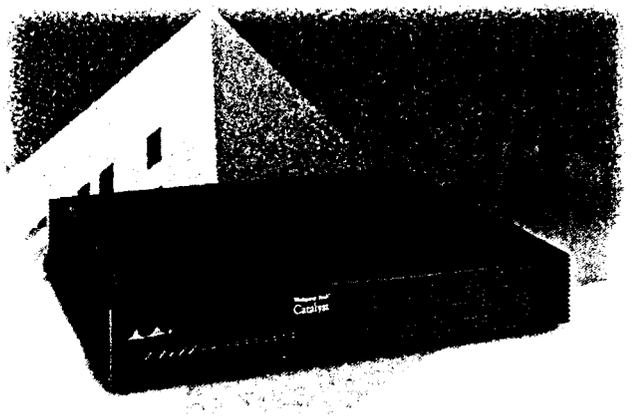
Applications

Equally at home in small or medium-sized businesses and large enterprises, the Catalyst 2820 and 1900 switches provide cost-effective migration away from shared-media hubs in the wiring closet to Workgroup switching. With dual high-speed ports to service local servers, backbone uplinks, or connect multiple switches, these switches are adaptable for a variety of LAN applications.

In addition to Cisco's universal switching software features, the Catalyst 2820/1900 series switches provide these capabilities:

10BaseT support	12 to 24 switched 10BaseT ports and an AUI port	Devices attached to each port are guaranteed 10-Mbps bandwidth
	Catalyst 2820: Modular switched or shared 100BaseTX or 100BaseFX ports	Multiport repeater modules share 100-Mbps bandwidth among attached building server farms, supporting high-performance users or operating as a cost-effective, high-speed local backbone
100BaseT support	Catalyst 1900: Choice of integrated 100BaseT switched ports available in three models: one 100BaseTX port (12 10BaseT ports) two 100BaseTX ports (24 10BaseT ports) one 100BaseTX and one 100BaseFX port (24 10BaseT ports)	Provides unmatched Fast Ethernet configuration flexibility to satisfy requirements for performance, cabling, and cost
	CollisionFree® full-duplex 100-Mbps switching	Switched ports dedicate 100-Mbps bandwidth to an attached device and support full-duplex mode or increase performance (up to 200 Mbps) and distances between switches, routers, or servers (up to 2 km with fiber and full duplex)
FDDI support (Catalyst 2820 with FDDI module)	Choice of three modules-UTP SAS, fiber SAS, fiber DAS	Uses cost-effective UTP for desktop and within-floor connectivity; allows long-distance runs (up to 2 km) with fiber in vertical high-rises across campus
	IP fragmentation and MTU discovery (RFC 791, RFC 1191)	Enhances efficiency of data transfers in IP networks by allowing communication on the ring using 4500-byte maximum size packet of DDI
	APaRT for IPX and AppleTalk	Works immediately in all Novell environments without labor-intensive server and workstation reconfiguration; allows AppleTalk phase 1 and phase 2 devices to coexist without upgrading existing phase 1 devices
Exceptional performance	Nonblocking, ClearChannel architecture with a 1-Gbps bus and 3-MB shared memory buffer	Meets demands of a fully populated 10-Mbps system with all ports operating at wire speed; virtually eliminates dropped packets because of buffer overflow
	Up to 450,000-pps aggregate packet forwarding rate and 320-Mbps maximum forwarding bandwidth (Catalyst 2820; Catalyst 1900 varies by configuration)	Delivers high-performance switching for even the most demanding workgroup applications
	Packet forwarding rates-14,880 pps to 10-Mbps ports; up to 133,900 pps to 100BaseT ports; up to 100,000 pps to FDDI ports	
	Per-port broadcast storm control	Prevents faulty end stations from degrading overall system performance with broadcast storms

Feature	Function	Benefit
Security	Secure addressing: Secures a port to an individual MAC address or a group of up to 132 MAC addresses. Addresses can be manually entered or learned. Choice of actions upon secure address violation	For security-sensitive applications, prevents unauthorized users from accessing the network; provides administrators choice of security level, notification, and resulting actions
	Password-protected Telnet and out-of-band management; access to management console port is locked out for an administrator-defined time period upon entry of a definable number of invalid passwords	Protects against unauthorized configuration changes and unwanted intruders
	Intraswitch VLANs	Controls access to sensitive resources within a workgroup or across the switched network
Fault tolerance	IEEE 802.1d Spanning Tree Protocol; one spanning tree per VLAN	Supports redundant backbone connections and loop-free networks for improved fault tolerance; provides simplified network configuration and improved fault tolerance for each VLAN
	Redundant power supply (RPS) option	Provides redundant power source for up to four units
	Low part count design with 50,000 hours calculated MTBF	Designed for highest reliability for maximum network uptime

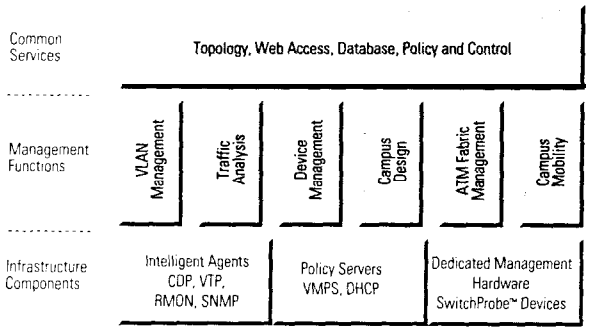


MULTILAYER SWITCH WITH LAYER 3 SWITCHING AND RMON CAPABILITIES

The Catalyst 1200 is ideal for smaller applications that require highly managed switching of Ethernet/FDDI networks. This solution benefits CAD/CAM groups, financial service organizations, and multimedia workgroups with high bandwidth requirements. At the Workgroup level, organizations can benefit from the Catalyst 1200's multilayer switching capabilities in addition to meeting a wide range of performance needs with both Ethernet and FDDI support.

In addition to Cisco's universal switching software features, the Catalyst 1200 switch provides these capabilities:

Feature	Function	Benefit
Multiples of eight I 0BaseT and 10BaseFL connections	Provides connections to either Ethernet workstations or hubs using copper or fiber connections	Eases deployment of switching into existing networks
1024 and 4096 addressing options	Supports either 1024 or 4096 stations attached to the switch	Allows deployment of switches in a variety of workgroup applications
Store-and-forward design	Checks packet integrity and discards bad data with low, predictable latency	Ensures that corrupted traffic is not proliferated through the network
High-speed switching technology	Delivers media-rate Ethernet-to-FDDI translational bridging and low latency (47 microseconds)	Enables applications to run at high network performance without delays
4-MB packet memory buffet	Provides buffeting between dissimilar network technologies (Ethernet/FDDI); provides buffeting for network traffic congestion conditions	Ensures reliable delivery of switched traffic, avoiding time-consuming retransmissions
Compact design (2.7 in. high)	Small enough for desktop switching needs while stackable for larger switching applications	Delivers scalable switching solution for growing workgroup networks
Nonvolatile RAM and Flash memory	Preserves configuration information and provides for network download of software updates	Eases configuration and maintenance of workgroup switches deployed in the network
Automatic Packet Recognition and Translation (APaRT) technology	Automatically translates traffic between Ethernet and FDDI networks for plug-and-play configurations	Allows Ethernet clients and FDDI server resources to communicate without switch or workstation configuration

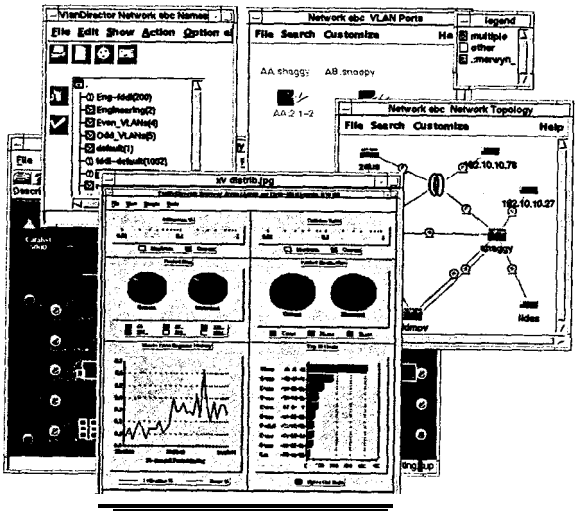


Cisco's switched internetwork management software model delivers comprehensive, industry-leading management solutions.

Managing Campus Intranets

No network solution is complete without comprehensive management tools that give network management staff rhe ability to configure, track, monitor, and troubleshoot networks both from a device level and as a unified system. As both switched infrastructures and services expand to handle increased bandwidth and performance requirements, these management tools manage networks with security services, quality of service, and reliability services. Cisco Systems has developed CiscoWorks for Switched Internetworks, a comprehensive switched management toolset. As one common product offering, CWSI offers both infrastructure management services and policy-based management control.

As switched internetworks evolve, Cisco continues to enhance and introduce new network management tools specifically designed for the needs of emerging switched internenvorks. CWSI serves six key functions in the network: topology management, device configuration management, traffic reporting, VLAN management, ATM management, and policy-based management.



CiscoWorks for Switched Internetworks provides integrated management control from a central topology map Clickmg items in the map launches features for device configuration, traffic reporting, VLAN configuration, ATM device management, and policy controls

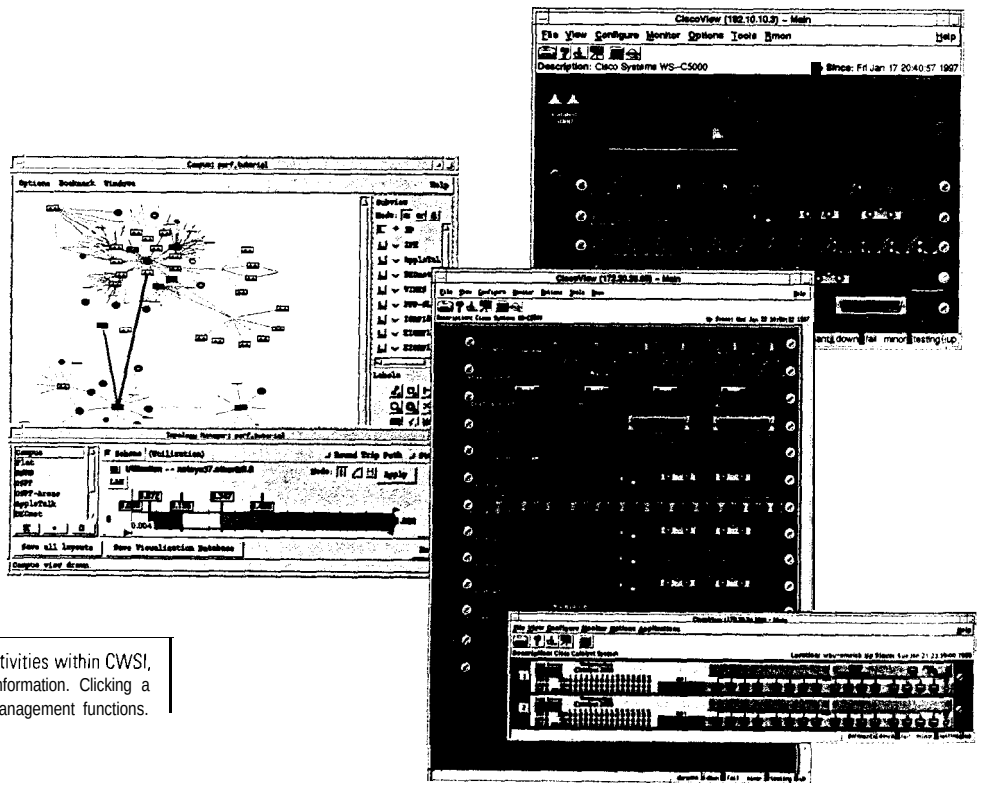
Topology Management

To track and manage switches within a campus network, one must know where switches are physically located and how they are connected. A graphical view of network topology-or on-screen map-locates specific devices and is the launch point for other functions such as device configuration, traffic reporting, and link analysis features. CWSI lets administrators view their campus networks consisting of Catalyst switches with automated tools, an enriched multithreaded process for more rapid device discovery, and topology views showing all network segments in a single map.

Device Configuration Management

Intuitive device configuration tools substantially reduce the complexity of keeping switches operational and staff well trained. Although command line interfaces may seem faster, they are difficult to use. Network managers need an easier way to see the operational status of a device in order to determine whether and where there are problems.

CWSI contains a graphical device management tool that gives a comprehensive view of any Catalyst switch product for configuring the chassis, interface, and port settings. Launched from the topology map, it is easy to configure an interface card or port, generate reports on chassis and port utilization, or troubleshoot.



As the focal point for all management activities within CWSI, topology maps show extensive network information. Clicking a segment or device launches additional management functions.

With a graphical view, it's easy to configure any Catalyst switch at a device. interface card, or port level.

TRAFFIC REPORTING

Understanding traffic behaviors requires usage data and application profiles. This data helps when troubleshooting or understanding who uses the network and with what applications. Traffic data analysis both helps eliminate problems that could impact overall network performance and reliability and aids future growth planning.

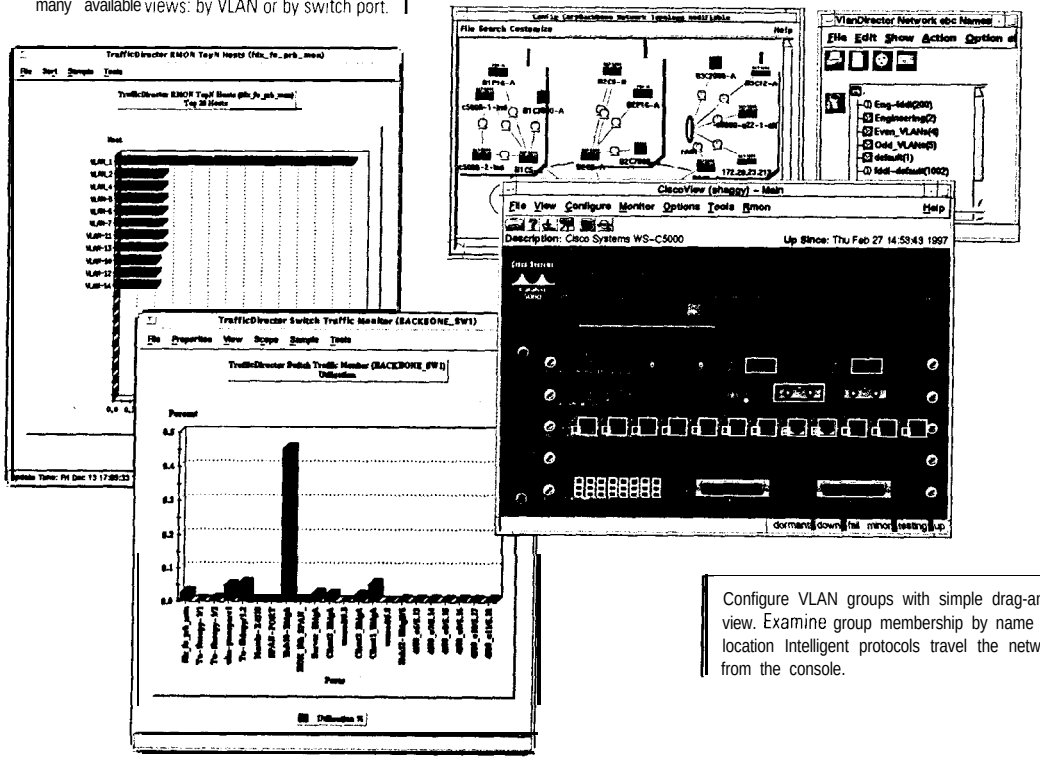
Cisco is the first switch vendor to offer RMON instrumentation across the Catalyst product line, integrating common traffic reporting functions into CWSI. These functions include the ability to select an RXION-enabled port from the graphical device view of a switch and create a traffic report showing errors, collisions, packet size distribution, and utilization by unicast, broadcast, and multicast. It is a quick, easy, and reliable way to understand traffic patterns across a switch.

VLAN MANAGEMENT

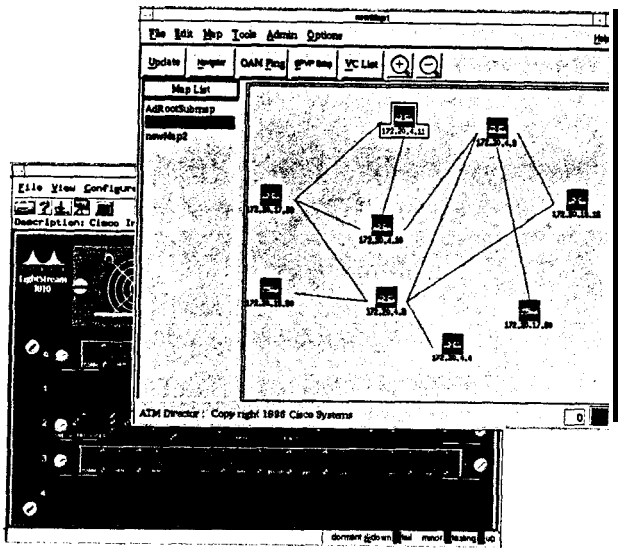
VLANs are useful for segmenting large switched topologies into manageable broadcast groups. Critical to VLAN deployment is the ability to configure broadcast groups across the campus, with easy moves, adds, and changes of end-station host devices. Cisco leads the industry with an intelligent VLAN configuration protocol, Virtual Trunking Protocol (VTP), and advanced drag-and-drop graphical utilities that configure switch ports and ISL trunks.

Cisco plans to extend VLAN display capabilities to include spanning tree forwarding paths, root devices, and ISL-enabled trunk links. Further, Cisco adds graphical LANE configuration capabilities for automated setup of LECS, LES, and BUS functions, distributed per VLAN across ATM edge switch interfaces. Cisco LANE configuration supports Simple Server Redundancy Protocol (SSRP) to redundant LANE services.

Traffic reports gather data from external SwitchProbe devices or Internal RMON agents to help administrators identify congested or problem areas Here are just two of many available views: by VLAN or by switch port.



Configure VLAN groups with simple drag-and-drop of port icons from the device view. Examine group membership by name or IP address, or check physical location Intelligent protocols travel the network for automatic device configuration from the console.



Manage ATM links by clicking an interface card or port in the device view to configure, monitor, or troubleshoot ATM links

ATM MANAGEMENT

ATM tools discover ATM network topology and display a network map with real-time, link-level information to configure, trace, and monitor virtual connections across an ATM network. ILMI and PNNI protocols help administrators configure, monitor, and troubleshoot a network of LightStream 1010 switches, Cisco ATM-attached routers (such as the Cisco 7500 series), Catalyst 5500 switches with ATM Switch Processor modules, and other Catalyst LAN switches with ATM uplink modules.

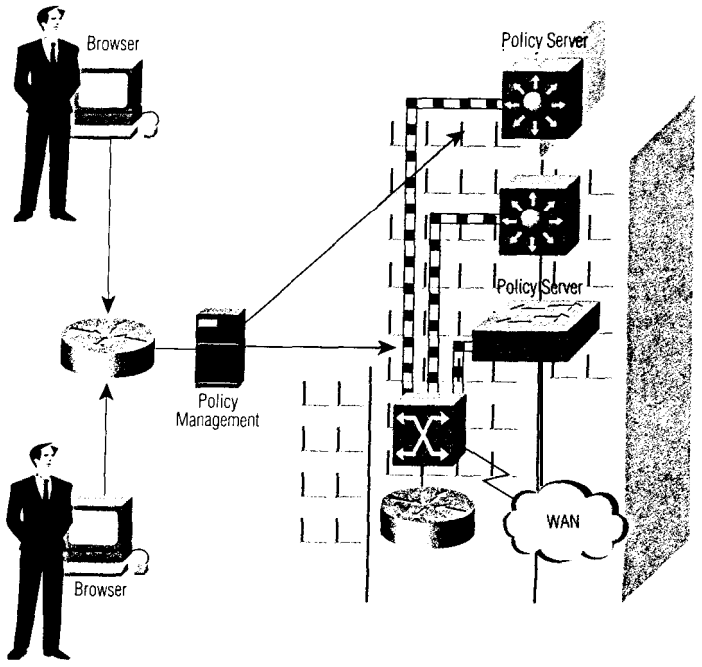
POLICY-BASED MANAGEMENT

As networks expand, they become increasingly difficult to manage and control on a device-by-device basis. Implementing defined policies across an enterprise addresses network-wide service issues such as automatically determining VLAN membership associations, network authentication, and single-points-of-failure analysis. To reduce the complexities of managing large networks, Cisco is developing a set of policy management tools within future releases of CWSI.

Policy-based management tools implement and enforce services across a network Policies span security, mobility, reliability, multimedia, and quality-of-service issues

Cisco IOS Features:

- Security
- Mobility
- Reliability
- Multimedia
- Quality of Service



To further enhance managability of the network, Cisco offers a series of RMON-based dedicated SwitchProbe devices for detailed traffic collection and analysis. These devices attach easily to the network and have a wide selection of LAN media interfaces including Ethernet, Fast Ethernet, Token Ring, and FDDI. Used in addition to the embedded RMON agents in Catalyst switches, SwitchProbe devices constantly monitor the network to better understand protocol behaviors, top host talkers, application usages, and traffic conditions that can lead to failures. The SwitchProbe products are commonly attached to the designated SPAN ports on the Catalyst switches, offering a convenient location from which to redirect traffic for detailed traffic analysis.

The following table summarizes the CWSI management features for the Catalyst switches:

	Feature	Function	Benefit
Topology management	Autodiscovery of switched intranets	Graphical physical and logical displays of configurations between switches	Enhances network visibility for tracking and managing underlying infrastructure
Device configuration management	Graphical device display of Catalyst switches	Accurate depiction of device configurations, including chassis, interface, and port settings	Reports and displays configuration data quickly and accurately
	Pull-down graphic menus for changing configuration parameters	SNMP-based configuration tool with comprehensive set-and-get functions	Minimizes training costs throughout the MIS organization
Traffic reporting	Detailed breakdown of traffic data by unicast, broadcast, multicast, and packet size distribution levels	RMON-based reporting tool for analyzing network traffic	Effective troubleshooting and planning tool for understanding network utilization
	Customized reporting of traffic data by selected switch port	Extensible reporting engine with predefined display templates per Catalyst chassis types (Catalyst 5000, Catalyst 3000, and so forth)	Simplifies the reporting and display of traffic behaviors by selected switch
VLAN management	Enablement of ISL and LANE trunk links across the campus backbone per configured VLAN	Campus-wide VLAN configuration setup, display, and reporting application	Xlinimizes VLAN configuration tasks by automating the setup of VLANs across the infrastructure
	Drag and drop of ports, trunk links, and switches into selected VLANs	Intuitive graphical interface for adding and changing users to VLANs	Intuitive, reliable approach for making logical configuration changes
ATM management	Graphical configuration of LANE services, including the LES, BUS, and LECS components	Autodiscovery, display, and configuration of LightStream 1010 and Catalyst 5500 ATM switches and the associated LAN-to-ATM uplink interfaces	Configuration simplification for setting up VLANs across ATM backbones
	PVC and SVC trace analysis tool	Detailed health and reporting displays of PVC and SVC connections between ATM switches	Enhanced troubleshooting capabilities for understanding ATM circuit connections, including health and performance
Policy-based management	Autoconfiguration of users to VLANs based upon authenticated rights and privileges	End-host registration to Cisco's virtual membership policy server (VMPS)	Increased campus mobility and security
	Location tracking and address verification of all attached end hosts	Dynamic learning of end-station locations and the associated MAC and IP addresses	Enhanced visibility and end-station location utilities

Cisco Switching Products

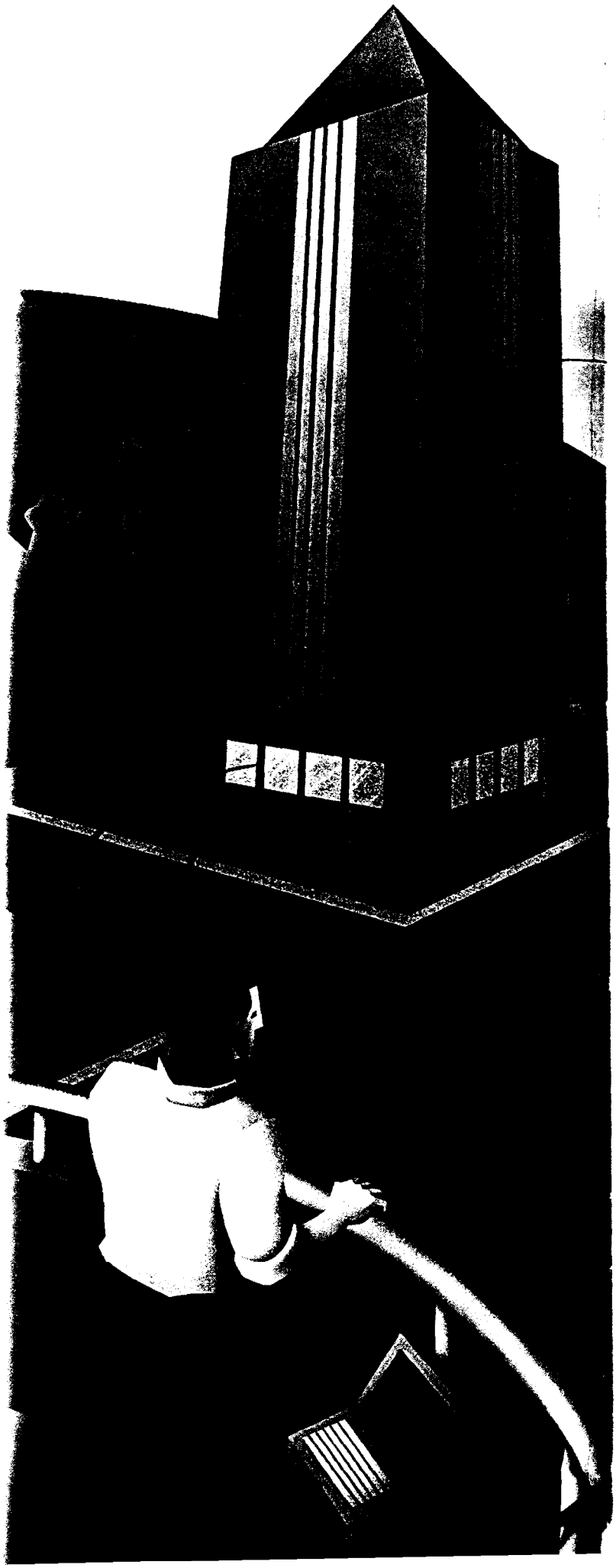
THE CISCO ADVANTAGE

Networking technology is continually evolving, and as a result, the primary concerns facing network managers have changed as well. Among these concerns are the need for production-ready switching for today's network-intensive client/server, Web browser, and network multimedia/multicast applications to keep businesses competitive well into the next century. Cisco Systems answers the call with the Catalyst family of switches, a comprehensive line of switches designed to help users scale their intranets to meet traffic demands from sophisticated network applications and services. All Catalyst switches employ high-performance, switched internetworking hardware and Cisco IOS software to deliver cost-effective bandwidth and a wide range of network services to ensure security, reliability, manageability, and scalability in growing switched internetworks. Along with routing, WAN switching, ATM switching, and the CiscoFusion architecture that binds them, these innovative switching products ensure that network administrators accommodate the needs of their existing applications while scaling their intranets for future networking technologies and advanced applications in a Cisco IOS software end-to-end network solution.

Service and support for the Catalyst switch family are available on a one-time or annual contract basis. Support ranges from desk assistance to proactive, onsite consultation. All core support contracts include major Cisco IOS updates, full access rights to Cisco Connection Online, advance replacement of hardware, and 24-hour-a-day technical assistance. Contact your local sales office for further information.

Check out the Cisco Systems Web site for more information about Catalyst switching products:

http://www.cisco.com/warp/customer/729/index.html.



Quick Reference Tables *for Catalyst Family Switches*

Supporte I Media

Media/Product	5500	5000	5002	3100	3016	3200	2900	2820	1900	1200
10BaseT	·	•	•	•	•	•	•	•	•	•
10BaseFL	·	•	•	•	•	•	•			•
10Base2				•	•	•				
10/100BaseTX	·	•	•	•	·	·	·	100BaseTX Only	•	
100BaseFX	·	·	·	·	·	·	·	·	•	
ATM LANE	·	•	•	•	•	•		•		
ATM Switching	·									
FDDI/CDDI	·	•	•					•		•
Fast EtherChannel	•	•	•							

Cisco IOS Software

Feature/Product	5500	5000	5002	3100	3016	3200	2900	2820	1900	1200
Multilayer Switching	·	·	·	·	·	·				•
Scalability Services										
NetFlow Switching	•	•	•							•
ISL VLAN	·	•	•	•	•	•	•	Future	Future	
LANE VLAN	·	·	·	·	·	·		Future		
802.10 VLAN	·	·	·							•
Multimedia Services										
CGMP	·	·	·	•	•	•	•	•	•	•
Security Services										
Port Lockdown	·	·	·	·	·	·	·	·	•	•

Resiliency Services

Feature/Product	5500	5000	5002	3100	3016	3200	2900	2820	1900	1200
Redundant Power Supplies	·	·	·	·	·	·		·	·	
Redundant Switch Processors	•	•		•	•	•				
Hot Swap	•	•	•					•		
Spanning Tree per VLAN	•	•	•	•	•	•	•	•	•	•

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